

Plant protection in organic crop husbandry

(1) Optimisation of cultivation

(1) Organic fertilisation

(2) Increase of biodiversity

- **Biological and biotechnological regulation of pest & diseases & weeds**
- **Plant protection products & plant improvers based on organic and inorganic substances**

(1) Predators & beneficial organisms



**PLANT PROTECTION
IN ORGANIC FARMING**

ALL ACTIVITIES IN

CROP CULTIVATION

AND

ANIMAL HUSBANDRY
(Handling of farm yard
manure and/or slurries)

CAN BE CONCEIVED AS

**PREVENTATIVE
PLANT PROTECTION**





NON-CHEMICAL HUSBANDRY PRACTICES INFLUENCING THE CROP ECOSYSTEM IN ORDER TO CONTROL PEST AND DISEASES (according to LAMPKIN 1990)

OPTIMAL SITE CONDITIONS

- Cultivations
- Organic manuring and crop nutrition
- Stalk and residue destruction
- Soil moisture and irrigation

DIVERSITY OVER TIME

- Discontinuity of monocultures
- Crop rotations
- Use of short-maturing varieties
- Use of crop-free or preferred host-free periods
- Manipulation of sowing and harvesting dates



NON-CHEMICAL HUSBANDRY PRACTICES INFLUENCING THE CROP ECOSYSTEM IN ORDER TO CONTROL PEST AND DISEASES (according to LAMPKIN 1990) (2)

DIVERSITY IN SPACE

- Varietal mixtures
- Resistant cultivars
- Crop mixtures
- Intercropping
- Undersowing
- Soil cover
- Management of wild plants in and around crops

ALTERING PEST BEHAVIOUR

- Use of trap crops
- Use of green manures
- Size, planting density, shape of crop
- Pheromones

BIOLOGICAL CONTROL

- Augmentative releases of beneficial insects and pathogens
(Use of biotechnical means)

SUCCESSION IN THE SOLUTION OF SPECIFIC DISEASE OR PEST PROBLEMS

CHANGES IN THE

1. HABITAT MANAGEMENT
2. SOIL AND ROTATION MANAGEMENT
3. NUTRIENT MANAGEMENT
4. PROTECTION MANAGEMENT
 - 4.1 Increase of endogenous resistance/tolerance
 - 4.2 Use of biological, physical, chemical means



SUPPRESSIVENESS OF SOILS

SOIL

- » MICROFLORA
- » FAUNA

PLANTS

- » RESISTANCE
- » TOLERANCE

INHIBITION

by Antibiotics

PROMOTION

of parasitism and
predators

COMPETITION

for nutrients

STIMULATION

of the development of
pathogens without hosts

IMPROVEMENT

of physico-chemical
soil conditions

CHANGE

of the feeding quality
of agricultural crops

INCREASE

of defense and resistance
mechanisms of plants



**INFECTION OF WINTER WHEAT BY
OPHIOBOLUS GRAMINIS AFTER VARIOUS
PRECEDING CROPS (SEIDEL 1969)**

PRECEDING CROP	DISEASE INDEX (%)
SPRING BARLEY	22,30 a
SPRING WHEAT	21,70 a
SHEEP´S FESCUE	16,00 b
OATS	13,70 c
FALLOW	13,30 c
MAIZE	13,30 c
SPRING RAPE	13,00 cd
SPRING RYE	12,70 cde
POTATOES	12,00 de
BEETS	11,50 ef
RED CLOVER	10,60 fg
CLOVER GRASS	10,30 fg
PEAS	10,30 g



Crop rotation in organic farming

diversity in time by a high degree of plant species

aim: to reach higher stability of agroecosystems towards the epidemic occurrence of pests diseases

examples:

- » » edge planting to disorient insects on their way to host plants
- » » mixtures of cultivars of plant species to diminish the rate of fungi diseases
- » » increase of nutrient supply for beneficials by undersowing techniques



Weed infestation in rye (*Secale cereale*) in response to field forage forage cultivation (mixture & cultivation time) and soil management (according to Kahnt 1986)

Mixture	Field forage cultivation			
	Tillage	1 y	2 y	3 y
		FFC	FFC	FFC
		Wheat	FFC	FFC
		Oats	Oats	FFC
		Rye	Rye	Rye
Grass clover-herbs		----- g / 1.5 m ² -----		
	Plough	185	90	100
	Rotary tiller	295	170	405
Grass clover				
	Plough	50	5	20
	Rotary tiller	375	185	320
Lucerne-sainfoin				
	Plough	525	20	80
	Rotary tiller	615	165	200



Grain yield of rye (*Secale cereale*) in response to field forage cultivation (mixture & cultivation time) and soil management (according to Kahnt 1986)

Mixture	Field forage cultivation			
	Tillage	1 y	2 y	3 y
		FFC	FFC	FFC
		Wheat	FFC	FFC
		Oats	Oats	FFC
		Rye	Rye	Rye
Grass clover-herbs		----- t / ha -----		
	Plough	2.4	3.2	3.6
	Rotary tiller	2.0	2.7	2.7
Grass clover				
	Plough	2.1	3.0	3.7
	Rotary tiller	2.2	2.6	3.2
Lucerne-sainfoin				
	Plough	2.5	3.1	3.5
	Rotary tiller	2.5	3.0	3.3



Effect of different annual green manures upon the occurrence of *Canadian thistle (Cirsium arvense)* (Hagmeier 1986)

